PHYTOTOXICOLOGY MOSS BAG ASSESSMENT SURVEY IN THE VICINITY OF UNIVERSAL TERMINAL LTD., IROQUOIS - OCTOBER 1987 THROUGH FEBRUARY 1988

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Report prepared by:
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Air Resources Branch

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Phytotoxicology Moss Bag Assessment Survey in the Vicinity of Universal Terminal Ltd., Iroquois - October 1987 through February 1988.

BACKGROUND

Since 1985, an annual moss bag survey has been conducted during the late fall through winter in the vicinity of Universal Terminal Ltd.(UTL), Iroquois, to determine the status of salt emissions associated with the once-yearly boat- salt unloading operations at UTL during the late fall. The latest survey (1987 - 1988) was requested by R.Delaquis, MOE, Cornwall. The results of the earlier moss bag surveys revealed significant off-site salt migration associated with the boat-salt unloading operations. The 1986 -1987 data further indicated that deicing salt applications to Lakeshore Drive by the County during the winter months also can be a significant salt source.

1987 - 1988 Moss Bag Survey

On October 21, 1987, single moss bags were placed at a height of about 3m (10') at 7 regular stations (Sites 2, 5, 8, 9, 10, 11, 13) established in previous years. The sites were situated along Lakeshore Drive at increasing distances to the west and east of UTL's salt storage pad (see attached figure). The bags were exchanged biweekly through to late February 1988 by R. Delaquis, MOE, Cornwall.

All moss bags subsequently were delivered to the Phytotoxicology Section for processing and were submitted, on dry weight basis, to the Laboratory Services Branch, MOE, to be analyzed for chloride and sodium.

OTHER RELATIVE INFORMATION

As indicated in the attached memorandum from R. Delaquis, UTL had received two boat shipments of salt during October 1987. The moss bag survey was set up one day prior to the second salt shipment being unloaded on the UTL pad. The " mountain" of salt was removed from the UTL pad between mid-December and late January. Also shown are the dates the local road authority applied deicing salt to Lakeshore Drive.

ANALYTICAL RESULTS

As shown on the attached table, at the end of the initial exposure eriod (Oct. 21 - Nov. 4, 1987), during which the 2nd boat-salt shipment was unloaded at UTL, concentrations of chloride and sodium at Site 5, to the immediate west of the UTL salt storage pad, were markedly elevated compared to the other results. During the two subsequent exposures (Nov. 4 - 18 ; Nov. 18 - Dec. 2, 1987), concentrations of chloride and sodium at sites neighbouring the UTL pad were markedly reduced and were similar to remote levels, indicating that the boat-salt unloading operations were responsible for the elevated salt levels found during the initial exposure.

The moss bag data for the December through January period, during which the UTL salt pile was removed, revealed two exposures (Dec. 2 - 16; Dec. 30 - Jan. 13, 1988) with markedly elevated concentrations of chloride and sodium at moss bag Site 5 and/or Site 2 in the immediate area of UTL. The fact that the levels found at remote sites during these exposures were appreciably lower would suggest that the salt pile removal operations (truck loading, truck traffic) were the primary source.

During the final two exposures, during which no salt was stored on the UTL pad, salt levels at several sites again were elevated, with the higher chloride concentrations (900 - 1,200 ppm), as during the

earlier exposures, being in excess of the Phytotoxicology Section Upper Limit of Normal rural chloride guideline (30 day exposure) of 300 ppm in moss. The fact that the highest chloride concentrations were detected at remote moss Sites 8, 11 and 13 would indicate that the deicing salt applications to Lakeshore Drive by the County were largely responsible for the elevated salt levels found during the final winter exposures. The fact that deicing salt had been applied to Lakeshore Drive on at least 6 occasions during each of the final two exposures (see attached memorandum) would further support this belief. The data for the earlier exposures from Dec. 2 through Jan. 27, 1988, during which the salt pile was removed, also would indicate that the road salting by the County had contributed to the elevated moss salt levels found during these winter exposures.

The highest moss bag chloride (2,500 ppm) and sodium (2,200 ppm) concentrations detected during the study were slightly higher than the highest levels (2,200 ppm Cl; 1,700 ppm Na) found in 1986 - 1987 but were lower than the higher levels of chloride (4,400 ppm) and sodium (2,600 ppm) found in 1985.

SUMMARY

In summary, the moss bag survey results for 1987 - 1988, as in previous years, indicate that the boat-salt unloading operations at UTL during the late fall can result in significant salt migration off the UTL property. The 1987 - 1988 survey results further revealed that the salt pile removal operations (truck loading etc.) can be a potential source of salt emissions. The more recent years' moss bag surveys also indicate that the applications of deicing salt to Lakeshore Dr. by the County during the winter had contributed to the elevated salt levels found in the moss bag survey area during the winter exposures.

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TABLE

Moss Bag Chloride and Sodium Concentrations (ppm, dry wt.) Detected at the End of Each Fourteen Day Exposure Period in the Vicinity of the UTL Salt Storage Pad - October 1987 through February 1988.

Exposure Period		Moss Bag Sodium and Chloride Concentration (ppm-dry wt.)						
		Sites West of UTL		Sites East of UTL Salt Pad				
		5 (150m)*	8 (1.1 km)	2 (500m)	9 (600m)	10 (625m)	11 (1.25km)	13 (1.25km)
Period When 2nd Salt Shipment was Unloaded on UTL Pad								
Oct. 21 - Nov. 4, 1987	Cl	1,600	200	200	200	300	200	200
	Na	2,200	150	180	210	210	190	190
Period When Salt Pile Remained Covered								
Nov. 4 - Nov. 18, 1987	Cl	100	100	<100	100	<100	100	100
	Na	460	580	360	390	490	480	570
Nov. 18 - Dec. 2, 1987	Cl	100	<100	-	<100	<100	<100	<100
	Na	110	530	110	86	140	310	480
Period When Salt Pile was Removed - Loaded onto Trucks								
Dec. 2 - Dec. 16, 1987	Cl	2,100	<100	<100	300	<100	300	100
	Na	840	560	480	870	270	740	700
Dec. 16 - Dec. 30, 1987	Cl	700	300	700	400	200	900	300
	Na	590	450	570	440	300	730	620
Dec. 30 - Jan. 13, 1988	Cl	2,000	500	2,500	600	400	900	800
	Na	1,400	500	1,800	580	430	600	640
Jan. 13 - Jan. 27, 1988	Cl	800	600	900	500	400	700	-
	Na	690	600	840	530	420	570	690
Period Following Removal of Salt Pile								
Jan. 27 - Feb. 10, 1988	Cl	1,100	700	-	500	-	1,200	-
	Na	800	620	1,600	500	510	910	910
Feb. 10 - Feb. 24, 1988	Cl	200	-	300	100	300	200	900
	Na	1,600	360	500	210	300	620	830

* Approximate distance from UTL salt pile.

Note: Chloride results underlined exceed the Phytotoxicology Section Upper Limit of Normal rural chloride guideline of 300 ppm in moss; this guideline is based on a 30 day exposure period. No guideline for sodium in moss has been established by the Phytotoxicology Section.

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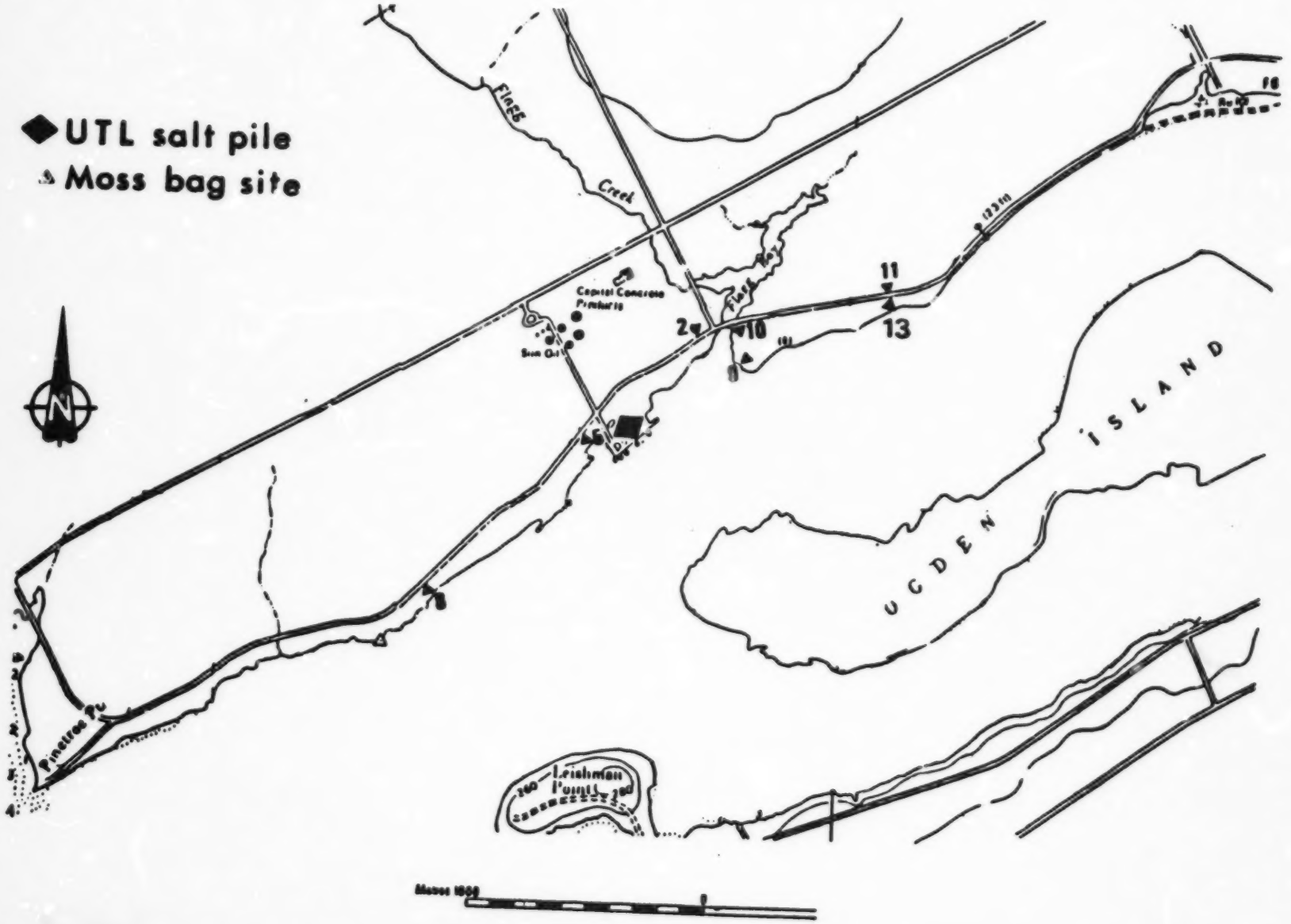
Approximate Moss Bag Locations In Relation To The UTL Salt Storage Pad - October 1987 Through February 1988.



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March 4, 1988

TO: R. N. Emerson
Phytotoxicology Section

FROM: Rhéal R. Delaquis
Environmental Officer

RE: **U.T.L. Moss Bag Survey**

The moss bag survey in the vicinity of U.T.L. in the Township of Matilda was performed during the winter of 1987/88.

The initial set of moss bags was installed after the first cargo of salt. Only two loads were deposited on the pad this year. The unloading of these two salt shipments occurred on October 17 and October 22, 1987. On October 19, 1987, the salt "mountain" was covered with a plastic tarp. The second shipment was also tarped on October 23, 1987.

Monitoring started October 21, 1987, and moss bags were changed every fourteen days until February 24, 1988. Sites 11, 13, 9, 10, 2, 5, and 8 were used as monitoring stations.

The covered salt "mountain" remained untouched until December 15, 1987. On the latter date, salt was being loaded onto trailers and being trucked from the site. The salt removal was completed on or about January 22, 1988. The salt "mountain" remained covered with a tarp until complete removal. The westerly working face was uncovered during the loading operations.

The local road authority informed me that salt had been applied on parts or all of Lakeshore Drive on the following dates:

November 6, 7, 25, 26, 27, 29
December 2, 4, 8, 9, 15, 17, 19, 20, 21
Janaury 2, 5, 8, 9, 12, 13, 14, 17, 18, 19, 20, 24, 25, 28
February 2, 4, 5, 8, 9, 10, 12, 13, 14, 15, 17, 20

Rhéal Delaquis
Environmental Officer

RD/ls